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Brookhaven National Laboratory
Waste Management Facility

Facility Environmental Monitoring Report

Calendar Year 2001

BROOKHAVEN
NATIONAL LABORATORY

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Brookhaven National Laboratory
Waste Management Facility
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Summary of Results*: Analysis of environmental samples collected at the WMF from January through December 2001 indicates that WMF operations have not impacted groundwater quality. Groundwater analyses indicate that metals, anions and radionuclides are at concentrations that are consistent with established background levels. Low levels of several volatile organic compounds (1,1,1-trichloroethane and MTBE) have been detected in several WMF area wells, but these contaminants are not related to WMF operations.*

Environmental TLD measurements indicate that dose rates in the vicinity of the WMF are equivalent to background values. Furthermore, There were no contaminants identified in water samples collected from SPDES Outfall 003 that could be attributed to storm water run-off originating on the WMF grounds.

Background

The WMF is designed to safely handle, repackage, and temporarily store BNL derived wastes prior to shipment to an off-site disposal or treatment facility. The WMF has been designed with engineering controls that meet all applicable federal, state, and local environmental protection requirements. Moreover, institutional controls such as spill prevention plans, operations management plans, maintenance, and personnel training will ensure that the facility will operate in a manner that is protective of the environment and human health.

The WMF is located adjacent to BNL Potable Supply Wells 11 and 12, which are located south of East Fifth Avenue and just north of the WMF site (Figure 1). Because of the close proximity of the WMF to Potable Wells 11 and 12, it is imperative that the engineered and institutional controls discussed above are effective in ensuring that waste handling operations at the WMF do not degrade the quality of the soils and groundwater in this area. The groundwater monitoring program for the WMF is designed to supplement the engineered and institutional controls by providing additional means of detecting potential contaminant releases from the WMF.

Environmental Monitoring Program

BNL has established an environmental monitoring program at WMF to evaluate potential impacts to environmental quality and to demonstrate compliance with DOE requirements

and applicable federal, state and local laws, regulations and permits. Groundwater monitoring is a requirement of the RCRA Part B permit issued for Waste Management Facility operations. The environmental monitoring program for the WMF is described in the BNL Environmental Monitoring Plan (Daum *et al*. 2000; BNL, 2001b). The monitoring programs specifically designed for the WMF area are summarized below.

Monitoring Results

Groundwater

The WMF's groundwater monitoring program is designed to provide a secondary means of detecting groundwater contamination in the event that a spill or leak from the WMF goes undetected using the (primary) engineered and institutional controls. Eight wells are used to monitor for potential contaminant releases from the three main waste handling and storage buildings and assess background water quality (Figure 1). Groundwater monitoring results for CY 2001 are consistent with previous monitoring, and continue to show that WMF operations are not impacting groundwater quality.

Radiological Analyses: Radioactivity levels in samples collected from the WMF wells were generally typical of ambient (background) levels (Table 1). No Laboratory related radionuclides were detected in the WMF wells during CY 2001.

Non-radiological Analyses: All water quality and most metals concentrations were below the applicable New York State Ambient Water Quality (NYS AWQS) (see Tables 2 and 3). As in past years, sodium was detected at concentrations above the NYS AWQS of 20 mg/L in upgradient well 055-03 at a maximum concentration of 59.1 mg/L. Low levels of 1,1,1-trichloroethane (TCA) and chloroform continue to be detected in several wells, but at concentrations below NYS AWQS. In February 2001, the gasoline additive methyl tertiary butyl ether (MTBE) was detected in well 056-22 at a concentration of 6.2 µg/L. MTBE concentrations dropped to nearly non-detectable levels for the remainder of the year. The NYS water quality standard for MTBE is 10 µg/L. A source for the MTBE has not been identified.

During 2000, TCA and DCE were detected in upgradient Well 066-07 at concentrations up to 153 µg/L and 35 µg/L. As noted above, during 2001 TCA concentrations in this well dropped to a maximum of 2.6 µg/L, and DCE was not detected in any of the samples. It is believed that the TCA and DCE contamination originated from historical releases from Building 830. In December 2000, BNL conducted an investigation into current and historical operations at Building 830, which included the installation of temporary wells. Although TCA had been used during metal cleaning operations, BNL could not identify a continuing source for the contamination. It is unlikely that contamination from this facility will significantly impact groundwater quality in the WMF area.

Potable Water Supply Wells

During CY 2001, analysis of potable water samples from Supply Wells 11 and 12 found all water quality parameters to be within NYS Drinking Water Standards. The Environmental Services and Plant Engineering Division's jointly monitor potable Supply Wells 11 and 12. Sampling frequency and analyses are described in the annual BNL Potable Water System Sampling Plan (BNL, 2001a) and the BNL Environmental Monitoring Plan (Daum *et al*., 2000; BNL, 2001b). In addition to the required Safe Drinking Water Act monitoring, the supply wells are monitored quarterly for gross alpha/beta, gamma, and tritium, and Sr-90. Potable water system analytical results are provided to the Suffolk County Department of Health Services on a monthly basis and are summarized in the annual BNL Site Environmental Report.

State Pollutant Discharge Elimination System (SPDES)

Storm water run-off from the Waste Management Facility roofs and pavement is conveyed to a SPDES permitted outfall (Outfall 003). In 2001 this discharge was monitored monthly for oil and grease, pH, and flow. Additionally under the BNL environmental surveillance program, the discharge is also sampled quarterly for volatile organics, metals, anions (chlorides, nitrates and sulfates), and field measured parameters (pH, conductivity). There were no contaminants identified during 2001 that could be attributed to Waste Management operations.

Environmental TLDs

Measurements of environmental background radiation are conducted through a network of onsite and offsite environmental TLDs. The TLDs allow for the measurement of radiation from cosmic and terrestrial sources, as well as any contribution from Laboratory operations. One of the TLDs (066-400) is located between the WMF and Recharge Basin HO. TLD data are collected from this monitoring location on a quarterly basis. The ambient dose rates for the four quarters were 16.7, 15.4, 13.8, and 16.4 mrem, respectively. The annual external dose at this location was estimated to be 62.3 ± 3.0 mrem, and by comparison the dose rates were similar to normal background rates found in the area. For comparison, the dose rate for CY2000 at this location was 74.8 ± 11.3 mrem/year.

Evaporator Facility

Some of BNL's liquid wastes contain residual radionuclides. Many of these radionuclides are removed from the liquid waste by using a reverse osmosis process conducted at the Waste Concentration Facility (Building 811). However, because of the chemical properties of tritium, it cannot be removed from the water using this process. The tritiated water is delivered to the BNL Evaporator Facility (Building 802B), where it is converted to steam and released as airborne emission. The evaporator facility was constructed to reduce the total amount of tritiated water released to the Peconic River from BNL operations. The evaporator facility was not operating during 2001, and therefore there were no air emissions from this facility.

Future Monitoring Actions

The following actions are recommended:

- Petition the NYSDEC to modify the RCRA Part B Permit groundwater monitoring requirements. Starting in CY 2002, with NYSDEC concurrence, reduce monitoring frequency to semiannual, and analyze samples for gross alpha, gross beta, gamma, and VOCs. Drop requirements for metals and anions analyses.
- Continue the TLD monitoring program on it current schedule.

References

BNL, 2001a. Letter from L.E. Cunniff to K. Newcomer. *Brookhaven National Laboratory 2000 Potable Water Sampling Plan* (January 2001).

BNL, 2001b. *Brookhaven National Laboratory Environmental Monitoring Plan, CY 2001 Update* (January 2001). BNL-52584 Update.

Daum, M., Dorsch, W., Fry, J., Green, T., Lee, R., Naidu, J., Paquette, D., Scarpitta, S., and Schroeder, G., 2000. *Brookhaven National Laboratory, Environmental Monitoring Plan 2000* (March 31, 2000).

BNL Facility Environmental Monitoring Report
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Gross Alpha, Gross Beta, Tritium and Gamma Spectroscopy Results
First Half of CY 2001
Table 1A

Well	Sample Period	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Tritium (pCi/L)	Gamma Spectroscopy Results
55-03 (a)	February	<0.6	<2.0	<344	NOR
	May	5.7 +/- 0.8	6.0 +/- 1.5	<344	NOR
55-10 (a)	February	0.86 +/- 0.4	2.4 +/- 1.3	<344	ND
	May	<0.7	<2.0	<344	NOR
56-21	February	<0.6	2.6 +/- 1.3	<344	ND
	May	<0.8	5.7 +/- 1.5	<317	NOR
56-22	February	<0.6	3.2 +/- 1.3	<344	NOR
	May	<0.8	2.2 +/- 1.4	<317	NOR
56-23	February	1.8 +/- 0.6	14.5 +/- 1.7	<344	NOR
	May	<0.8	2.7 +/- 1.4	<317	NOR
66-07 (b)	February	<0.6	2.6 +/- 1.3	<344	Be-7 = 990 pCi/L (c)
	May	<0.8	5.2 +/- 1.5	<317	ND
66-83 (b)	February	<0.6	<2.0	<344	NOR
	May	<0.8	<2.0	<317	NOR
66-84	February	<0.6	2.0 +/- 1.3	<344	ND
	May	<0.8	<2.0	<317	ND
Typical MDL		1.1	2.2	300	--
SDWA Limit		15	50	20,000	--

NOR = Only naturally occurring radionuclides were detected (e.g., K-40, Bi-214, Pb-212, and Pb-214).
ND = No gamma emitting radionuclides detected.
MDL = Minimum Detection Limit.
(a): Upgradient well in all potential groundwater flow patterns.
(b): Upgradient or side gradient well during this sample period.
(c): Be-7 detected in this sample is probably due to sample cross contamination. Be-7 is an activation product typically associated with accelerator facilities, and has a half-life of only 53 days. Drinking water limit based upon 4 mrem/yr dose is 6,000 pCi/L.
Note: SDWA Limit is based upon 40 CFR 141 Safe Drinking Water Act

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Gross Alpha, Gross Beta, Tritium and Gamma Spectroscopy Results
Second Half of CY 2001
Table 1B

Well	Sample Period	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Tritium (pCi/L)	Gamma Spectroscopy Results
55-03 (a)	August	<0.8	4.8 +/- 1.5	<314	NOR
	November	<0.8	<1.9	<313	NOR
55-10 (a)	August	5.3 +/- 0.9	5.4 +/- 1.4	<314	NOR
	November	<0.8	<1.9	<313	ND
56-21	August	<0.8	2.7 +/- 1.4	<314	NOR
	November	<0.8	2.5 +/- 1.2	<313	ND
56-22	August	<0.8	2.6 +/- 1.4	<314	NOR
	November	<0.8	2.2 +/- 1.2	<313	ND
56-23	August	0.9 +/- 0.6	3.5 +/- 1.5	<314	ND
	November	<0.8	2.0 +/- 1.2	<313	NOR
66-07 (b)	August	<0.8	<2.0	<314	ND
	November	<0.8	6.4 +/- 1.4	<325	NOR
66-83 (b)	August	<0.8	<2.0	<314	NOR
	November	<0.8	<1.9	<313	ND
66-84	August	<0.8	<2.0	<314	NOR
	November	<0.8	<1.9	<313	ND
Typical MDL		1.1	2.2	300	--
SDWA Limit		15	50	20,000	--

NOR = Only naturally occurring radionuclides were detected (e.g., K-40, Bi-214, Pb-212, and Pb-214).
ND = No gamma emitting radionuclides detected.
MDL = Minimum Detection Limit.
(a): Upgradient well in all potential groundwater flow patterns.
(b): Upgradient or side gradient well during this sample period.
Note: SDWA Limit is based upon 40 CFR 141 Safe Drinking Water Act

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Water Quality Results
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Table 2A

Well	Sample Period	Chlorides (mg/L)	Sulfates (mg/L)	Nitrate (mg/L)
55-03 (a)	February	17.3	10.4	<1.0
	May	46.2	10.0	1.1
55-10 (a)	February	28.1	13.3	<1.0
	May	33.5	9.6	<1.0
56-21	February	14.2	16.4	<1.0
	May	18.6	15.6	<1.0
56-22	February	10.1	18.8	2.5
	May	10.2	19.4	2.0
56-23	February	10.3	16.5	1.7
	May	11.1	15.9	3.2
66-07 (b)	February	19.0	24.3	1.9
	May	19.8	23.7	2.4
66-83 (b)	February	10.9	14.6	1.1 J
	May	12.9	12.9	<1.0
66-84	February	16.5	9.4 J	<1.0
	May	17.5	9.5	<1.0
Typical MDL		4.0	4.0	1.0
NYSAWQS		250	250	10

(a): Upgradient well in all potential groundwater flow patterns.
(b): Upgradient or side gradient well during this sample period.
MDL: Minimum Detection Limit
J: Estimated value

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Water Quality Results
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Table 2B

Well	Sample Period	Chlorides (mg/L)	Sulfates (mg/L)	Nitrate (mg/L)
55-03 (a)	August	111.3 J	11.7 J	1.1 J
	November	43.4	7.9	1.2
55-10 (a)	August	33.6	9.1 J	<1.0
	November	28.3	14.4	<1.0
56-21	August	33.5	20.6 J	1.9 J
	November	19.3	21.5	1.1
56-22	August	12.4	18.8 J	2.1 J
	November	14.8	15.8	2.0
56-23	August	9.3	16.4 J	1.3 J
	November	8.1	15.1	3.9
66-07 (b)	August	28.5	18.8	1.9 J
	November	16.5	14.7	3.9
66-83 (b)	August	9.7	20.1	1.6 J
	November	9.1	7.6	<1.0
66-84	August	18.0	10.1	<1.0
	November	18.3	9.8	<1.0
Typical MDL		4.0	4.0	1.0
NYSAWQS		250	250	10

(a): Upgradient well in all potential groundwater flow patterns.
(b): Upgradient or side gradient well during this sample period.
MDL: Minimum Detection Limit
J: Estimated value

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Metals Analytical Results
First Half of CY 2001
Table 3A

Well	Sample Period	Ag (mg/L)	Al (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Fe (mg/L)	Hg (mg/L)	Mn (mg/L)	Na (mg/L)	Pb (mg/L)	Zn (mg/L)
55-03 (a)	February	<0.001	0.004	<0.0011	<0.001	0.002	<0.075	<0.0001	<0.002	18.4	<0.0013	<0.004
	May	<0.001	0.004	<0.0011	<0.001	0.013	<0.075	<0.0001	<0.002	27.4	<0.0013	0.006
55-10 (a)	February	<0.001	<0.002	<0.0011	<0.001	<0.002	<0.075	<0.0001	<0.002	16.9	<0.0013	<0.004
	May	<0.001	0.005	<0.0011	<0.001	0.002	<0.075	<0.0001	<0.002	18.4	<0.0013	<0.004
56-21	February	<0.001	0.008	<0.0011	<0.001	0.002	<0.075	<0.0001	0.005	16.2	<0.0013	<0.004
	May	<0.001	0.006	<0.0011	<0.001	<0.002	<0.075	<0.0001	0.002	14.2	<0.0013	0.006
56-22	February	<0.001	0.005	<0.0011	<0.001	<0.002	<0.075	<0.0001	0.003	9.0	<0.0013	<0.004
	May	<0.001	0.008	<0.0011	<0.001	<0.002	<0.075	<0.0001	0.004	6.9	<0.0013	<0.004
56-23	February	<0.001	0.003	<0.0011	<0.001	<0.002	<0.075	<0.0001	<0.002	8.4	<0.0013	<0.004
	May	<0.001	0.005	<0.0011	<0.001	<0.002	<0.075	<0.0001	0.002	8.1	<0.0013	0.011
66-07 (b)	February	<0.001	<0.002	<0.0011	0.001	<0.002	<0.075	<0.0001	<0.002	17.8	<0.0013	<0.004
	May	<0.001	0.005	<0.0011	0.001	<0.002	<0.075	<0.0001	0.003	14.5	<0.0013	0.005
66-83 (b)	February	<0.001	<0.002	<0.0011	<0.001	<0.002	<0.075	<0.0001	<0.002	12.4	<0.0013	<0.004
	May	<0.001	0.010	<0.0011	<0.001	<0.002	<0.075	<0.0001	<0.002	13.5	<0.0013	<0.004
66-84	February	<0.001	<0.002	<0.0011	<0.001	0.002	<0.075	<0.0001	<0.002	14.7	<0.0013	<0.004
	May	<0.001	0.003	<0.0011	<0.001	<0.002	<0.075	<0.0001	<0.002	13.5	<0.0013	0.007
Typical MDL		0.001	0.002	0.001	0.001	0.002	0.075	0.0002	0.002	1.0	0.001	0.004
NYSAWQS		0.05	0.1	0.01	0.05	0.2	0.3	0.0007	0.3	20	0.025	0.3

Note: Primary potential contaminants shown. Other metals were analyzed for – see database for complete data set
MDL: Minimum Detection Limit
NA: Not analyzed for.
(a): Upgradient well in all potential groundwater flow patterns.
(b): Upgradient or side gradient well during this sample period.

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Metals Analytical Results
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Table 3B

Well	Sample Period	Ag (mg/L)	Al (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Fe (mg/L)	Hg (mg/L)	Mn (mg/L)	Na (mg/L)	Pb (mg/L)	Zn (mg/L)
55-03 (a)	August	<0.001	<0.002	<0.001	<0.001	0.005	<0.075	<0.0001	<0.002	59.1	<0.0013	<0.004
	November	<0.001	0.009	<0.001	<0.001	0.005	<0.075	<0.0001	<0.002	37.0	<0.0013	<0.004
55-10 (a)	August	<0.001	0.003	<0.001	<0.001	0.002	<0.075	<0.0001	<0.002	18.6	<0.0013	0.030
	November	<0.001	0.034	<0.001	<0.001	0.004	<0.075	<0.0001	0.002	19.9	<0.0013	<0.004
56-21	August	<0.001	0.014	<0.001	<0.001	<0.002	<0.075	<0.0001	0.025	17.5	<0.0013	0.096
	November	<0.001	0.002	<0.001	<0.001	<0.002	<0.075	<0.0001	0.023	16.1	<0.0013	<0.004
56-22	August	<0.001	0.006	<0.001	<0.001	<0.002	<0.075	<0.0001	0.002	8.1	<0.0013	0.012
	November	<0.001	0.003	<0.001	<0.001	<0.002	<0.075	<0.0001	<0.002	10.5	<0.0013	<0.004
56-23	August	<0.001	0.004	<0.001	<0.001	<0.002	<0.075	<0.0001	<0.002	8.1	<0.0013	0.022
	November	<0.001	0.029	<0.001	<0.001	<0.002	<0.075	<0.0001	<0.002	10.4	<0.0013	<0.004
66-07 (b)	August	<0.001	<0.002	<0.001	<0.001	<0.002	<0.075	<0.0001	<0.002	14.2	<0.0013	<0.004
	November	<0.001	<0.002	<0.001	<0.001	<0.002	<0.075	<0.0001	<0.002	9.9	<0.0013	<0.004
66-83 (b)	August	<0.001	<0.002	<0.001	<0.001	<0.002	<0.075	<0.0001	<0.002	13.3	<0.0013	<0.004
	November	<0.001	0.008	<0.001	<0.001	0.002	<0.075	<0.0001	<0.002	10.8	<0.0013	<0.004
66-84	August	<0.001	<0.002	<0.001	<0.001	<0.002	<0.075	<0.0001	<0.002	14.5	<0.0013	0.013
	November	<0.001	0.026	<0.001	<0.001	0.002	<0.075	<0.0001	<0.002	16.0	<0.0013	<0.004
Typical MDL		0.001	0.002	0.001	0.001	0.002	0.075	0.0001	0.002	1.0	0.001	0.004
NYSAWQS		0.05	0.1	0.01	0.05	0.2	0.3	0.0007	0.3	20	0.025	0.3

Note: Primary potential contaminants shown. Other metals were analyzed for – see database for complete data set
MDL: Minimum Detection Limit
NA: Not analyzed for.
(a): Upgradient well in all potential groundwater flow patterns.
(b): Upgradient or side gradient well during this sample period.

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Volatile Organic Compound Analytical Results
First Half of CY 2001
Table 4A

Well	Sample Period	1,1,1-TCA (ug/L)	Chloroform (ug/L)	1,1-DCE (ug/L)	1,1-DCA (ug/L)	MTBE (ug/L)
55-03 (a)	February	<2.0	<2.0	<2.0	<2.0	<2.0
	May	<2.0	<2.0	<2.0	<2.0	<2.0
55-10 (a)	February	2.6	<2.0	<2.0	<2.0	<2.0
	May	2.7	<2.0	<2.0	<2.0	<2.0
56-21	February	<2.0	<2.0	<2.0	<2.0	<2.0
	May	<2.0	<2.0	<2.0	<2.0	<2.0
56-22	February	<2.0	<2.0	<2.0	<2.0	6.3
	May	<2.0	<2.0	<2.0	<2.0	2.3
56-23	February	<2.0	<2.0	<2.0	<2.0	<2.0
	May	<2.0	<2.0	<2.0	<2.0	<2.0
66-07 (b)	February	<2.0	<2.0	<2.0	<2.0	<2.0
	May	<2.0	<2.0	<2.0	<2.0	<2.0
66-08 (b)	February	<2.0	1.2 J	<2.0	<2.0	<2.0
	May	<2.0	<2.0	<2.0	<2.0	<2.0
66-83 (b)	February	<2.0	<2.0	<2.0	<2.0	<2.0
	May	<2.0	<2.0	<2.0	<2.0	<2.0
66-84	February	<2.0	2.4	<2.0	<2.0	<2.0
	May	<2.0	2.5	<2.0	<2.0	<2.0
Typical MDL		2	2	2	2	2
NYSAWQS		5	7	5	5	10

MDL: Minimum Detection Limit
J: Estimated value (below MDL)
E: Estimated value (above MDL)
(a): Upgradient well in all potential groundwater flow patterns.
(b): Upgradient or side gradient well during this sample period.
(c): No standard established. Default value is shown.

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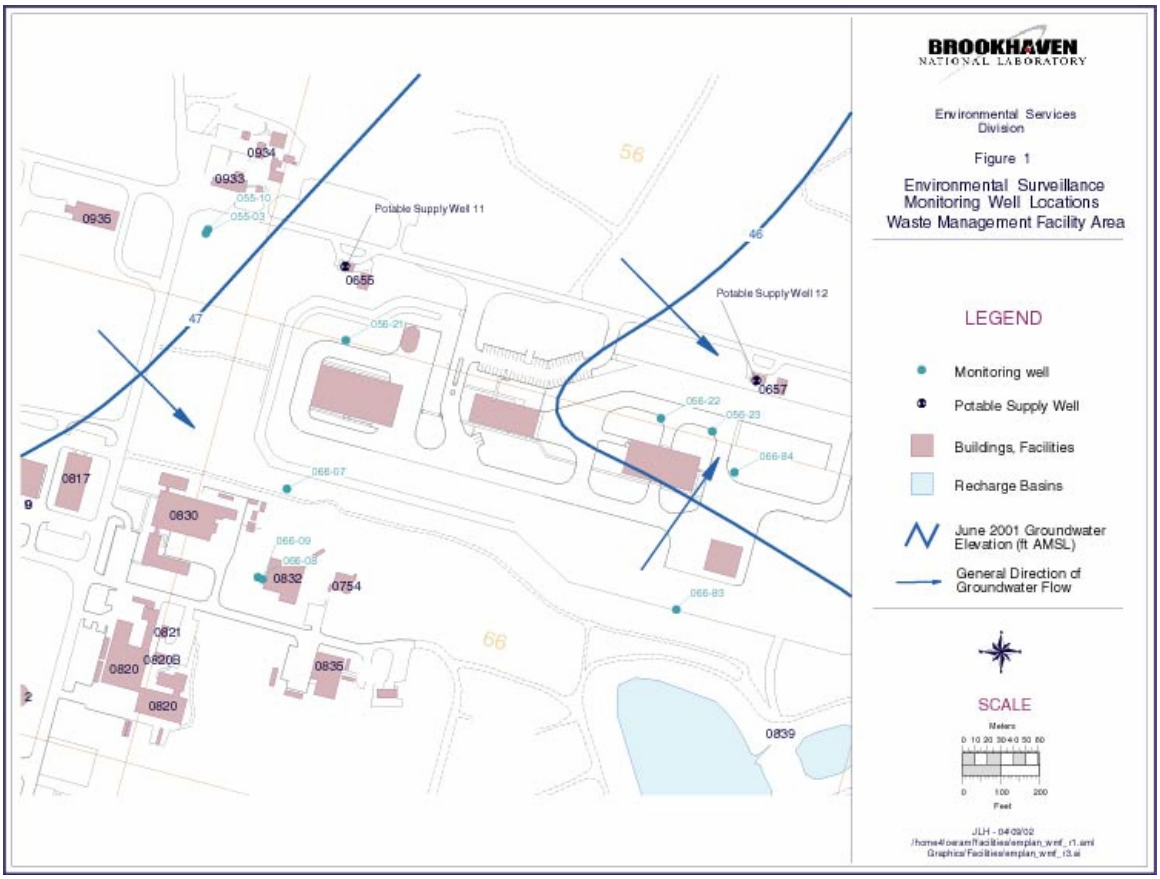
Second Half of CY 2001
Table 4B

Well	Sample Period	1,1,1-TCA (ug/L)	Chloroform (ug/L)	1,1-DCE (ug/L)	1,1-DCA (ug/L)	MTBE (ug/L)
55-03 (a)	August	<2.0	<2.0	<2.0	<2.0	<2.0
	November	<2.0	<2.0	<2.0	<2.0	<2.0
55-10 (a)	August	<2.0	<2.0	<2.0	<2.0	<2.0
	November	<2.0	<2.0	<2.0	<2.0	<2.0
56-21	August	<2.0	<2.0	<2.0	<2.0	<2.0
	November	<2.0	<2.0	<2.0	<2.0	<2.0
56-22	August	<2.0	<2.0	<2.0	<2.0	<2.0
	November	<2.0	<2.0	<2.0	<2.0	2.1
56-23	August	<2.0	<2.0	<2.0	<2.0	<2.0
	November	<2.0	<2.0	<2.0	<2.0	<2.0
66-07 (b)	August	2.6	<2.0	<2.0	<2.0	<2.0
	November	<2.0	<2.0	<2.0	<2.0	<2.0
66-08 (b)	August	<2.0	<2.0	<2.0	<2.0	<2.0
	November	<2.0	<2.0	<2.0	<2.0	<2.0
66-83 (b)	August	<2.0	<2.0	<2.0	<2.0	<2.0
	November	<2.0	<2.0	<2.0	<2.0	<2.0
66-84	August	<2.0	2.1	<2.0	<2.0	<2.0
	November	<2.0	2.5	<2.0	<2.0	<2.0
Typical MDL		2	2	2	2	2
NYSAWQS		5	7	5	5	10

MDL: Minimum Detection Limit
J: Estimated value (below MDL)
E: Estimated value (above MDL)
(a): Upgradient well in all potential groundwater flow patterns.
(b): Upgradient or side gradient well during this sample period.
(c): No standard established. Default value is shown.


BROOKHAVEN
NATIONAL LABORATORY
Environmental Services
Division
Figure 1
Environmental Surveillance
Monitoring Well Locations
Waste Management Facility Area
LEGEND
Monitoring well
Potable Supply Well
Buildings, Facilities
Recharge Basins
June 2001 Groundwater
Elevation (ft AMSL)
General Direction of
Groundwater Flow
SCALE
Meters
0 10 20 30 40 50 60
0 100 200
Feet
JLH - 04/09/02
/home4/oeam/facilities/emplan_wmf_r1.aml
Graphics/Facilities/emplan_wmf_r3.ai
Potable Supply Well 11
Potable Supply Well 12
0655
0657
0934
0933
0936
055-10
055-03
056-21
056-22
056-23
056-24
066-07
066-09
066-08
066-03
0817
0830
0832
0754
0821
0820B
0820
0835
0839
47
46
56
66